

**WHAT IS CLAIMED IS:**

1. A method of producing granulocyte-macrophage colony stimulating factor (GM-CSF) in a cereal crop comprising growing a cereal crop that has a stably integrated genetic construct that includes a regulatory region functional in a cereal crop operably associated with GM-CSF coding sequence, or a fragment, or derivative thereof, operably associated with a transcriptional terminator.
2. The method according to claim 1, wherein the cereal crop is selected from the group consisting of: rice, wheat, oats, rye, corn, sorghum, and barley.
3. The method according to claim 2, wherein the regulatory region is preferentially active in seeds.
4. The method according to claim 3, wherein the regulatory region comprises a glutelin 1 regulatory region.
5. The method according to claim 3, wherein the GM-CSF coding sequence is optimized for expression in a cereal crop.
6. The method according to claim 3, wherein the GM-CSF coding sequence encodes an N-terminal methionine residue.
7. The method according to claim 2, wherein the cereal crop is rice.
8. The method according to claim 7, wherein the GM-CSF coding sequence is optimized for expression in rice, japonica cultivar.
9. The method according to claim 3, wherein the GM-CSF coding sequence is operably linked to a signal sequence.
10. The method according to claim 8, wherein the GM-CSF coding sequence is SEQ ID NO:1.

11. A transgenic cereal crop plant comprising a stably integrated genetic construct that includes a regulatory region functional in a cereal crop operably associated with GM-CSF coding sequence, or a fragment, or derivative thereof, operably associated with a transcriptional terminator.
12. The transgenic cereal crop according to claim 11, wherein the cereal crop is selected from the group consisting of: rice, wheat, oats, rye, corn, sorghum, and barley.
13. The transgenic cereal crop according to claim 12, wherein the regulatory region is preferentially active in seeds.
14. The transgenic cereal crop according to claim 13, wherein the regulatory region comprises a glutelin 1 regulatory region.
15. The transgenic cereal crop according to claim 13, wherein the GM-CSF coding sequence is optimized for expression in a cereal crop.
16. The transgenic cereal crop according to claim 13, wherein the GM-CSF coding sequence encodes an N-terminal methionine residue.
17. The transgenic cereal crop according to claim 12, wherein the cereal crop is rice, japonica cultivar.
18. The transgenic cereal crop according to claim 17, wherein the GM-CSF coding sequence is optimized for expression in rice, japonica cultivar.
19. The transgenic cereal crop according to claim 13, wherein the GM-CSF coding sequence is operably linked to a signal sequence.
20. The transgenic cereal crop according to claim 18, wherein the GM-CSF coding sequence is SEQ ID NO:1.

21. A genetic construct comprising a regulatory region functional in a cereal crop operably associated with a GM-CSF coding sequence optimized for expression in a cereal crop operably associated with a transcriptional terminator.
22. The genetic construct according to claim 21, wherein the cereal crop is selected from the group consisting of: rice, wheat, oats, rye, corn, sorghum, and barley.
23. The genetic construct according to claim 22, wherein the regulatory region is preferentially active in seeds.
24. The genetic construct according to claim 23, wherein the regulatory region comprises a glutelin 1 regulatory region.
25. The genetic construct according to claim 23, wherein the GM-CSF coding sequence is optimized for expression in rice.
26. The genetic construct according to claim 23, wherein the GM-CSF coding sequence encodes an N-terminal methionine residue.
27. The genetic construct according to claim 22, wherein the cereal crop is rice, japonica cultivar.
28. The genetic construct according to claim 27, wherein the GM-CSF coding sequence is optimized for expression in rice, japonica cultivar.
29. The genetic construct according to claim 23, wherein the GM-CSF coding sequence is operably linked to a signal sequence.
30. The genetic construct according to claim 28, wherein the GM-CSF coding sequence is SEQ ID NO:1.
31. An isolated nucleotide sequence comprising the sequence set forth in SEQ ID NO:1.

32. A DNA vector comprising the genetic construct of claim 25.
33. A DNA vector comprising the isolated nucleotide sequence of claim 31.
34. A transgenic cereal crop plant comprising the genetic construct of claim 25.
35. A transgenic cereal crop plant comprising the isolated nucleotide sequence of claim 31.
36. A method of producing granulocyte-macrophage colony stimulating factor (GM-CSF) in a plant comprising, transforming the plant with a genetic construct comprising a regulatory region functional in said plant, operably associated with a GM-CSF coding sequence, or a fragment or a derivative thereof, operably associated with a transcriptional terminator, and;  
  
expressing said GM-CSF.
37. The method of claim 36, wherein said GM-CSF is human GM-CSF, a fragment or a derivative thereof.
38. The method of claim 37, wherein said GM-CSF exhibits between about 60% to 100%, preferably 80% to 100%, more preferably 95% to 100% of the activity of human GM-CSF.
39. The method of claim 36, wherein said plant is rice.
40. The method of claim 39, wherein said plant is rice, japonica cultivar.
41. The method of claim 36, wherein said genetic construct, or portion of the genetic construct is integrated into the genome of the plant.
42. The method of claim 36, wherein said genetic construct remains extrachromosomal.

43. A transgenic plant comprising a genetic construct comprising a regulatory region functional in said plant, operably associated with a plant optimized GM-CSF coding sequence or a fragment or a derivative thereof, operably associated with a transcriptional terminator.

44. A genetic construct comprising a regulatory region functional in a plant, operably associated with a GM-CSF coding sequence optimized for expression in a plant, operably associated with a transcriptional terminator.

45. The transgenic plant of claim 43, said plant a cereal plant.

46. The transgenic plant of claim 45, wherein said cereal plant is rice.

47. The transgenic plant of claim 46, wherein said plant is rice, japonica cultivar.

48. A plant seed comprising the genetic construct of claim 43.

49. A plant cell comprising the genetic construct of claim 43.